MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2015/2016

PTM0145 – TRIGONOMETRY

(Foundation in Information Technology / Life Sciences)

10 MARCH 2016
9.00 a.m. – 11.00 a.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of **TWO** pages excluding the cover page and the Appendix.

2. Answer **FIVE** out of **SIX** questions. All questions carry equal marks and the distribution of the marks for each question is given.

3. Please write all your answers in the Answer Booklet provided.

4. All necessary working steps **MUST** be shown.

Instruction: Answer **FIVE** out of **SIX** questions.

Question 1 **[10 marks]**

Given $\tan\theta = \frac{5}{9}$ and $\sin\theta < 0$, find the exact value of

i. $\sin 2\theta - \cos 2\theta$ (7 marks)

ii. $\tan\frac{\theta}{2}$ (3 marks)

Question 2 **[10 marks]**

Solve the equations:

a. $7\tan 2x + 6 = 0$ for $0° \le x \le 360°$. (4 marks)

b. $18\sin^2 x - 5\sin x - 2 = 0$ for $0° \le x \le 360°$. (6 marks)

Question 3 **[10 marks]**

The triangle PQR has lengths $PQ = 5$cm, $QR = 12$cm, and $\angle QPR = 80°$.
Solve the triangle PQR and find the area of the triangle. (10 marks)

Question 4 **[10 marks]**

Given $z = -6 - 5i$ and $w = 4(\cos 170° + i\sin 170°)$.

a. Find the polar form of z. (3 marks)

b. Find the polar form of $\frac{z}{w}$ and zw. (4 marks)

C. Find the polar form and standard form of w^4. (3 marks)

Continued...

Question 5 [10 marks]

Given the equation of the ellipse $25x^2+81y^2-200x+486y-896=0$.
Find the center, foci and vertices of the ellipse. Hence, sketch the ellipse.

(10 marks)

Question 6 [10 marks]

a. Given the matrices $A=\begin{bmatrix}8 & -5\\ 10 & 2\end{bmatrix}$ and $B=\begin{bmatrix}-1 & 0 & 7 & -9\\ 8 & 2 & -3 & 1\end{bmatrix}$, find AB.

(3 marks)

b. Solve the given system of linear equation by using the inverse matrix method.

$$9x+2y-2z=-6$$
$$y-2z=-4$$
$$18x+y+4z=9$$

(7 marks)

End of Page

APPENDIX

Trigonometry Identities

$$\cos^2 A + \sin^2 A = 1 \qquad \sec^2 A = 1 + \tan^2 A \qquad \csc^2 A = 1 + \cot^2 A$$

$$\cos(A+B) = \cos A \cos B - \sin A \sin B$$
$$\cos(A-B) = \cos A \cos B + \sin A \sin B$$
$$\sin(A+B) = \sin A \cos B + \cos A \sin B$$
$$\sin(A-B) = \sin A \cos B - \cos A \sin B$$
$$\tan(A+B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}$$
$$\tan(A-B) = \frac{\tan A - \tan B}{1 + \tan A \tan B}$$

$$\cos 2A = \cos^2 A - \sin^2 A$$
$$= 2\cos^2 A - 1 = 1 - 2\sin^2 A$$
$$\sin 2A = 2 \sin A \cos A$$
$$\tan 2A = \frac{2 \tan A}{1 - \tan^2 A}$$

$$\sin A \cos B = \frac{1}{2}[\sin(A+B) + \sin(A-B)]$$
$$\cos A \cos B = \frac{1}{2}[\cos(A+B) + \cos(A-B)]$$
$$\sin A \sin B = \frac{1}{2}[\cos(A-B) - \cos(A+B)]$$

$$\sin A + \sin B = 2 \sin \frac{A+B}{2} \cos \frac{A-B}{2} \qquad \sin A - \sin B = 2 \cos \frac{A+B}{2} \sin \frac{A-B}{2}$$

$$\cos A + \cos B = 2 \cos \frac{A+B}{2} \cos \frac{A-B}{2} \qquad \cos A - \cos B = -2 \sin \frac{A+B}{2} \sin \frac{A-B}{2}$$

$$\sin^2 \frac{A}{2} = \frac{1 - \cos A}{2} \qquad \cos^2 \frac{A}{2} = \frac{1 + \cos A}{2} \qquad \tan^2 \frac{A}{2} = \frac{1 - \cos A}{1 + \cos A}$$

$$\sin \frac{A}{2} = \pm \sqrt{\frac{1 - \cos A}{2}} \qquad \cos \frac{A}{2} = \pm \sqrt{\frac{1 + \cos A}{2}} \qquad \tan \frac{A}{2} = \pm \sqrt{\frac{1 - \cos A}{1 + \cos A}}$$

$$\tan \frac{A}{2} = \frac{1 - \cos A}{\sin A} = \frac{\sin A}{1 + \cos A}$$